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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

TRAN, BINH X

ART UNIT PAPER NUMBER

1765

DATE MAILED: 12/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/877,145

Applicant(s)

SAKAI ET AL.

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 23 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) 18-31 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 10-17 is/are rejected.
- 7) ☒ Claim(s) 8 and 9 is/are objected to.
- 8) ☒ Claim(s) 1-31 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Specification*

1. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1-7, 10-14, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chao et al. (US 6,599,842) in view of Nozawa et al. (US 6,224,677).

Chao discloses plasma processing method comprising:  
newly introducing a processing gas (120) into an evacuated chamber (101) to generate plasma (Fig 2A);

performing a plasma processing of a target object (110);  
exhausting said process gas from said evacuated process chamber (101) (via exhausting system 109, Fig 2A);

obtaining a predetermined property value to monitor the state of the plasma of the plasma (130) of the process gas with the process chamber (via process monitor 108, See Fig 2a, col. 4 lines 19-45);

controlling an introducing condition of the process gas into the process chamber so as to adjust a predetermined property value to a regulated value (Fig 2b).

Chao fails to disclose the step of introducing again part of the process gas exhausted from the chamber into the chamber again. Nozawa teaches to re-circulate part of the process gas exhausted from the process chamber into the process chamber (Fig 1-2, col. 5 lines 1-35). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Chao in view of Nozawa by re-circulate the exhausted gas because it will reduce the cost operation cost.

Respect to claim 2, Nozawa discloses that the introducing condition of the process gas is controlled by changing the circulation ratio using gas mixing regulation device (G). Chao discloses that the property value of the plasma depends on the gas flow rate and composition of each gas by controlling the plurality of valve 182, slit valve 114, mixer block 184 connected to the gas panel 120 (Fig 2b, col. 6 lines 54-67).

Respect to claims 3-4, Nozawa discloses either controlling the flow rate of re-circulating gas (Fig 1 pipe G2 on the right) or newly introducing gas (Fig 1). Respect to claim 5, Chao discloses the mixed gas can comprise at least two gas. Nozawa also discloses the mixed gas comprise at least two gas as well as controlling the flow rate of re-circulating gas and newly introduce gas.

Respect to claims 6, 11 Nozawa discloses a silicon oxide film formed on the silicon substrate (Nozawa col. 6 lines 25-29). Nozawa further discloses that the silicon oxide is processed using plasma. Since Nozawa teaches the circulating ratio is controlled or changed by gas mixing regulating device, the property of the plasma at the time before changing the circulating ratio must exist. The examiner certainly can interpret any property value of the plasma before changing the circulating ratio as the regulated value.

Respect to claims 7, 17 Nozawa discloses there is a valve for re-circulating gas before the gas was mixed inside the regulating device G (Fig 1). This valve can only be in either the "open" or "close" mode. If this valve is in the "close" mode, then the circulating ratio is zero. Further, the circulating ratio is a result effective variable. The result effective variable is commonly determined by routine experiment. The process of conducting routine experiments so as to produce an expected result is obvious to one of ordinary skill in the art.

Respect to claim 10, 16, Nozawa discloses the process gas exhausted from the chamber is re-circulated easily without changing the component of the process gas. The limitation of claims 12-14 has been discussed above.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chao and Nozawa in view of Saito et al. (US 5,565,114).

Respect to claim 15, Chao and Nozawa fail to disclose the property value represents the light emission intensity from CF<sub>2</sub> radicals. However, both Chao and Nozawa clearly disclose the use of the gas mixture containing C and F (col. 6 lines 20-25). Saito discloses the use of C-F base gas as well as monitor the light emission of CF<sub>2</sub> (col. 16 lines 8-25). It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Chao and Nozawa in view of Saito by monitoring the light emission intensity of CF<sub>2</sub> radicals because they can be detected by the photo-detector to determine the endpoint.

#### ***Allowable Subject Matter***

6. Claims 8-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

#### ***Response to Arguments***

7. Applicant's arguments with respect to Grimbergen's reference have been considered but are moot in view of the new ground(s) of rejection.

The applicants further argue that "in the method of Nozawa et al., since the recovered cleaning gas has been filtered, cooled and liquidified, there is no need to control the introducing condition of the process gas". The examiner disagrees. Nozawa clearly teaches the introducing of recovered cleaning gas was control by plurality of valves and gas mixing regulation device (Fig 1).

The applicants further argue that the examiner's reason (i.e. reduce the operation cost) to combine the references is "unsubstantiated statement of questionable relevance to Applicants' claimed invention". The applicants implied that the examiner is "replying on personal knowledge". The examiner strongly disagrees with this argument. Nozawa clearly discloses that the advantage to recycle the process gas is reducing operation cost (See col. 1 line 63 to col. 2 line 5). This is certainly not the examiner's personal knowledge.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-

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1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran

*SUPERVISORY*  
*NADINE NORTON*  
*PRIMARY EXAMINER*  
*Nadine Norton*